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THE ORGANIZATION OF SOVIET GEODESY AND CARTOGRAPHY

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THE ORGANIZATION OF SOVIET GEODESY AND CARTOGRAPHY

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SUMMARY

This report establishes the organization and structure of the Main Administration of Geodesy and Cartography of the U.S.S.R. as known from available open source material. This type of information, fairly abundant before 1940, becomes very scarce after that year. It is estimated that by 1953, some 9,000 technical personnel were connected with the Main Administration of Geodesy and Cartography.

The corresponding organizational picture for the Administration of Military Topographers cannot be established at this time because of the almost complete lack of pertinent open source material.

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I. MAIN ADMINISTRATION OF GEODESY AND CARTOGRAPHY (GUGK)

The present organization known as the Main Administration of Geodesy and Cartography (GUGK, Glavnoye Upravleniye Geodezii i Kartografii) is the result of a long evolution of Soviet institutions and its history may be briefly represented as follows:

- 1919 VGU: Supreme Geodetic Administration
(Vyssheye Geodezicheskoye Upravleniye)
- 1925 G GK: Main Committee of Geodesy
(Glavnyy Geodezicheskii Komitet)
- 1930 GGU: Main Geodetic Administration
(Glavnoye Geodezicheskoye Upravleniye)
- 1933 GGGGU: Main Geologic, Hydrologic and Geodetic Administration
(Glavnoye Geologo-Gidro-Geodezicheskoye Upravleniye)
- 1935 GUGSK: Main Administration of National Surveying and Cartography
(Glavnoye Upravleniye Gosudarstvenny S"yemki i Kartografii)
- 1939 GUGK: Main Administration of Geodesy and Cartography
(Glavnoye Upravleniye Geodezii i Kartografii)

A. VGU, 1919-1925. This organization was established on March 15, 1919, by a decree of the Soviet of People's Commissars. It was empowered to

- (a) carry out systematic topographic, geodetic and leveling work,
- (b) organize map production for all departments of the government,
- (c) coordinate all geodetic and cartographic work in the U.S.S.R.,
- (d) direct all geodetic and cartographic work,
- (e) work out technical geodetic and cartographic instructions and rules obligatory for all departments of government.

This formulation of responsibilities is equally applicable to all successors of the VGU. Nevertheless, it was found necessary to reorganize

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the VGU several times before a stable organization, the GUGK, was developed. There are two reasons for these frequent re-organizations; (1) lack of experience, personnel and equipment and (2) political considerations.

Contrary to the original intention, the VGU was attached to one particular department of the government, the Supreme Council of National Economy (VSNKh, Vysshiiy Soviet Narodnogo Khozyaysta) and its authority to regulate geodetic and cartographic activity of other agencies was questioned. At any rate, the VGU was unable to supervise all cartographic and geodetic work in the U.S.S.R. because of the lack of technical personnel. Even as late as 1924, (that is, five years after its organization) the VGU had at its disposal less than 200 geodesists and only 21 cartographers. The amount of available equipment was pitiful, and had to be imported from abroad.

While there is no need to describe all details of the organization of the VGU, some aspects of its structure should be explained in order to make further discussion profitable.

The policy-making department of the VGU was the Collegium, exactly as it is now in the GUGK, as follows:

Administration and Organization

Financial

Topographic and Geodetic

Cartographic

Optics and Mechanics

Geodetic Archives

Technical Council

The VGU has eight field offices in the following cities:

Leningrad

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Moscow

Sverdlovsk

Rostov

Omsk

Saratov

Minsk

Khar'kov

B. GCK, 1925-30. On May 14, 1925 a Geodetic Committee (Geodezicheskiy Komitet) was established under the State Planning Commission (Gosplan). This committee took over from the VGU the work of coordination of all geodetic and cartographic work in the Soviet Union. The change was obviously necessary because of the lack of authority it had over other government agencies and departments. At the same time a permanent commission was appointed to coordinate the activity of the VGU and the Military-topographic section (VTO) of the army. The Technical Council of the VGU became merely a consulting body with no authority outside of the VGU.

In September 4, 1926, the VGU was re-named the Geodetic Committee in the Main Mining-Fuel-Geologic-Geodetic Administration (Glavnoye Gorno-Toplivnoye Geologo-Geodezicheskoye Upravleniye) still at the VSNKh (Supreme Council of National Economy). In 1928 it was further renamed, the Main Geodetic Committee (GCK, Glavnyy Geodezicheskiy Komitet).

There were thus for some five years (1926-1931) two organizations both of which were called Geodetic Committees; one at the Gosplan to direct and coordinate work of all map agencies in the U.S.S.R. and the other at the Supreme Council of National Economy (VSNKh) to carry out actual work in geodesy and cartography.

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Such separation of responsibilities introduced confusion and could not be tolerated very long, especially because of the rapid development of field work and cartographic factories.

C. GGU, 1930-1933. In 1930 the Geodetic Committee of the VSNKh was transformed into the Main Geodetic Administration (GGU; Glavnoye Geodezicheskoye Upravleniye) and the Geodetic Committee of the Gosplan was abolished in 1931 and its functions were taken over by the GGU. However, even then the GGU was not an independent department in the government, but attached to the Commissariat of Heavy Industry. The coordination of geodetic and cartographic work in all agencies was to be effected through the Inter-Department Geodetic Council, (Mezhdunarodstvennyy Geodezicheskiy Soviet) whose decisions were to be carried out by the GGU. The actual surveying operations were to be performed by the Institute of Basic Geodetic Work (IOGR: Institut Osnovnykh Geodezicheskikh Rabot) which was soon replaced by the Trust of Basic Geodetic and Gravimetric Work (VTOGIOR: Vsesoyuznyy Treust Osnovnykh Geodezicheskikh i Gravimetricheskikh Rabot). Thus for the first time gravimetry was included in the program of geodetic surveying. At the same time cartographic activities of two organizations carrying out aerial surveying operations, "Dobrolet" and "Ukrovozdukhput", were included in the system of the GGU.

D. GGGGU, 1933-1935. During this period, because of considerations that are not easy to understand, the geodetic survey was combined with the geologic survey into the Main Geologic, Hydrologic and Geodetic Administration (GGGGU: Glavnoye Geologo-Gidro-Geodezicheskoye Upravleniye). The system was extremely cumbersome and is considered by Soviet writers as some sort of "twilight period of Soviet geodesy".

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E. GUGSK, 1935-1939. On June 15, 1935 another reorganization took place. The GGGGU was abolished and replaced by the Main Administration of National Surveying and Cartography (GUGSK: Glavnoye Upravleniye Gosudarstvennoy S"yemki i Kartografii). This time the GUGSK was attached to the Commissariat of Interior.

F. GUGK, 1939 to the present. By 1938 it became clear that the only way to solve the problem of co-ordination and organization of geodetic and cartographic work in the country was to establish an organization with both legislative and executive authority outside of any existing Commissariat. Accordingly, a decision was made in September 14, 1938 to separate the Geodetic and Cartographic Office from the Commissariat of Interior and make it a separate department in the Soviet government. The new organization became known as the Main Administration of Geodesy and Cartography (GUGK: Glavnoye Upravleniye Geodezii i Kartografii) at the Council of Commissars, later at the Council of Ministers.

The duties and responsibilities of the GUGK were itemized in a decree of the Council of Commissars U.S.S.R. of August 23, 1939. This date should be considered as the beginning of activity of the GUGK. (See Figure 1)

This decree, with subsequent alterations, (up to 1941) is given in Appendix I. Undoubtedly there have been other, more recent changes in the organization of the GUGK, but very little is known about them. In view of the possibility of changes in the structure of the GUGK, all efforts have been made to use the most recent information so as to present an up-to-date picture. The organizational chart which accompanies this report is based on the study of all available material and should be substantially correct.

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1. Policy-Making Bodies of the GUCK

Chief and Deputy Chiefs. The GUCK is headed by a chief, (nachal'nik) whose duties are defined in the statutes (Appendix I, Section 5). The chief in 1951 was Aleksandr Nikiforovich Baranov who received (2) Stalin's prize of first class (with six other people) for the publication in 1950 of the "Sea Atlas", Vol. 1. In source (2) the photograph of Baranov indicates his age as about 55 or 60.

Baranov has been chief of the GUCK since at least 1939. From source (3) we learn that he is a graduate of the Moscow Institute of Engineers of Geodesy, Aerial Surveying and Cartography (MIIGAik) and is probably a competent man. The same source states that Baranov received a medal for the construction of the Moscow subway, presumably for the organization of surveying work.

There are two deputy-chiefs. The first deputy-chief of the GUCK in 1949 was S. G. Sudakov (4) who is also a graduate of the MIIGAik (3). Both Baranov and Sudakov are described in source (3) of 1939 as "brought up by the party organization" and undoubtedly are members of the Communistic Party in good standing.

The other deputy-chief in 1949 was Georgiy Kuz'mich Zubakov, named in source (4) as simply, deputy-chief, apparently a position inferior to the first deputy-chief, Sudakov. In this source Zubakov is referred to as engineer-geodesist, so that in all probability he is also a graduate of MIIGAik. He and Sudakov were awarded the Order of the Red Banner (with three other engineers) for organizing and carrying out over a period of many years geodetic and cartographic work in exceptionally difficult regions.

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Attached to the chief's office are two consulting bodies: the collegium and the council.

a. The Collegium (Kollegiya GUGK), as follows from the statutes (Appendix I, Section 7), consists of members of the GUGK, usually division chiefs, under the chairmanship of the chief of the GUGK and is some sort of review board of activities of the GUGK. Decisions of the collegium are to be carried out by the chief of the GUGK.

The composition of the Collegium in 1940 may be given here to illustrate one point: it consists of competent people with the necessary technical background (all with the degree of engineer-geodesist):

Chairman: A.N. Baranov, chief of GUGK

Members: S.G. Sudakov, chief of aerogeodetic establishments
 V.D. Tatarnikov,
 G.K. Zubakov, deputy chief
 T.I. Mukhin, chief of cartographic industry GUGK
 A.Sh. Tatevyan, Director of TsNIIGAIK
Krasovskiy F.N. Korsovskiy, Professor at MIIGAIK
 P.V. Pavlovskiy, connection unknown

As an illustration of the activity of this body the following items may be quoted. In 1948 the Collegium considered and accepted (6) the five-year plan of research work at the TsNIIGAIK, (Central Scientific Research Institute of Geodesy, Aerial Surveying and Cartography) including 11 topics in geodesy, six in astronomy, eight in aerial surveying and photogrammetry, and eleven in cartography. This would indicate very close supervision of research activities of the Central Institute by the Collegium. In the same source we find detailed instructions to the chiefs of various departments of the GUGK, formulated by the Collegium to facilitate the introduction of the Krasovskiy ellipsoid.

b. The Council. (Sovet GUGK) as defined in the statutes (Appendix I, Section 9) is to meet once or twice monthly to discuss the most important work of the GUGK. The important aspect of the activity of the Council is the co-ordination of work between the various government organizations engaged in cartographic and geodetic work. This undoubtedly involves military organizations and for that reason the decisions of the council are not published. There is no information available concerning the membership of the Council.

2. General Agencies

a. Central Cartographic and Geodetic Archives (TsKGF: Tsentral'nyy Kartografo-Geodezicheskiy Fond) is described in a source (5) of 1952 as follows: It is supposed to collect and make available for use all maps printed in the U.S.S.R. and all data on geodetic and cartographic work in the U.S.S.R. which are considered to be of national importance. This would include, for instance, lists of triangulation and astronomic positions. By law every map published by civil organizations in the U.S.S.R. must be deposited in the TsKGF which publishes catalogues which include complete description of these maps. An up-to-date record of the status of cartographic coverage is maintained on the 1:1,000,000 index map (dezhurnaya karta).

In 1949 the chief of this section of the TsKGF was Ye. M. Kos'mova, a woman (4). The map-gathering activity is not restricted to TsKGF, however, and there are at least three other organizations within the GUGK engaged in similar work but for somewhat different purposes. These will be discussed in their proper relationships later in this report.

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b. Publishing House of Geodetic and Cartographic Literature.

(Geodezizdat: Izdatel'stvo Geodezicheskoy i Kartograficheskoy Literatury). The address of this publishing house is Moscow, Proyezd Vladimirova, No. 6, but the most surprising circumstance is that all recent books, instructions, atlases, etc. appear to have been printed at the Riga Cartographic Factory, Riga, Altonavas, No. 43.

The chief of the Geodezizdat in 1949 was A.I. Salomatin (6). The special publishing house for the GUGK was established in 1940, but it has history reaching back to 1933 when the Editing Bureau (Redbyuro Goskartrest) was first established (7).

The activity of the publishing house of the GUGK may be described as follows:

Publication of serials like Geodizist and Sbornik NTiPS.

Publication of textbooks and monographs.

Publication of Trudy TsNIIGAIK.

Publication of reports of field parties.

Publication of instructions, regulations, orders, forms, etc.

1'. Geodezist

Since the publication of the periodical, "Geodezist", is specifically mentioned in the statutes, (Appendix I, Section 13) a short description is included.

After several unsuccessful attempts by the members of the Administration of Military Topographers (VTU: Voenno Topograficheskoye Upravleniye) to start a professional periodical, the "Geodezist" was organized by the VTU and VGU (Vyssheye Geodezicheskoye Upravleniye) in 1925. It was to serve,

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then, both the military and civil geodetic and mapping establishments. The journal was a great success, remarkable for its detailed chronicle of events in geodesy and cartography both in the U.S.S.R. and abroad. In 1931 the "Geodezist" became the official organ of the GGU (Glavnoye Geodezicheskoye Upravleniye) but its connection with VTU remained unbroken. In connection with the 15th anniversary of the periodical, articles were published (8) praising this journal very highly. Nevertheless, the publication of the "Geodesist" was abruptly terminated in this year without explanation. Perhaps the general disruption of life in the U.S.S.R. because of the war was responsible.

2'. Sbornik NTiPS

In 1941 the GUGK began to publish its own serial, "Sbornik Nauchno-Technicheskikh i Proizvodstvennykh Statey po Geodezii, Kartografii, Topografii, Aeros"ymke i Gravimetrii", (Collection of Scientific, Technical and Production Articles in Geodesy, Cartography, Topography, Aerial Surveying and Gravimetry) of which 33 issues were published between 1941 and 1950. However, since 1950 there may have been another change in the publication. Most recent information indicates the existence of Vol. 1 and 2 of "Sbornik Statey po Geodezii", (Collection of Articles in Geodesy), 1951, also published by the GUGK (9). Either the scope of this collection has been limited to geodesy, or this is a new serial, replacing the Sbornik NTiPS.

c. Central Scientific Research Institute of Geodesy, Aerial Survey and Cartography (TsNIIGAIK): Tsentral'nyy Nauchno-Issledovatel'skiy Institut Geodezii, Aeros"ymeki i Kartografii) in Moscow. The detailed account of this Institute was given in Technical Paper No. 162

of the Mapping and Charting Research Laboratory. The institute is the primary research center of the GUGK.

d. Factory of Geodetic Instruments (Aerogeopribor). This factory and similar establishments have been discussed in the Mapping and Charting Research Laboratory Report entitled, "Soviet Geodetic and Photogrammetric Instrumentation".

e. Scientific Editing and Map Compilation Division (NRKCh: Nauchno-Redaktsionnaya Kartosostavitel'skaya Chast'). The Russian term is difficult to render, and its translation in the Statutes (Appendix I, Section 10) as Division of Map Publication Control is misleading. The duties of the NRKCh as defined in 1940 are (10):

- (a) Checking and correction of all available maps.
- (b) Correct organization of editing, compilation, etc.
- (c) The selection of the most efficient technology of cartographic work.
- (d) Development of control over contents and design of maps.
- (d) General preparation of maps for printing.

This organization was the outgrowth of a special research institute created for the Great Soviet Atlas of the World (NIIBSAM) in 1933. In 1938 this Institute was abolished and its personnel transferred to the newly created NRKCh of the GUGK. In 1940 the NRKCh had 131 "stakhanovites"; that is, exceptionally productive workers. The entire staff must, therefore, be very large. A pertinent and noteworthy fact is to that the GUGK is specifically charged with the compilation and publication of the Great Soviet Atlas (Statutes, Section 2b).

A source of 1949 (4) lists the names of ten employees of the NRKCh who had received decorations for excellent work, among whom were two senior

editors, S. N. Soldatov and S. N. Teplova. The chief of the NREKCh in 1940 was G. V. Artamonov, a graduate of the MIIGAik (3).

According to a source of 1952 (5) the NREKCh had a special reference section (OSKS: Otdel Sprayochnoy Kartograficheskoy Sluzhby) where a person interested in one particular region could obtain all available cartographic information, whether on the U.S.S.R. or of foreign countries.

f. Transcription Bureau (NTCh: Nauchno-Transkriptionnaya Chast') appears to be independent of NREKCh, since it is mentioned separately in the Statutes (Appendix I, Section 10). Nothing is known of its activity except a short notice of 1940 (11).

g. Administration of Supply (Upravleniye Snabzheniya). The head of this administration in 1948 was A.V. Batkov. The name of the administration is self-explanatory. It is supposed to supply all necessary material for the work of the various divisions of the GUCK (6).

h. Finance Planning Division mentioned in the Statutes (Section 10) may be combined now into one division of Planning and Economics (Plano-Ekonomicheskii Otdel). The head of it in 1948 was M.K. Bendovskiy (6).

i. Division of Cadres (Otdel Kadrov). The chief of this division in 1948 was V.V. Samoylova (a woman). The duty of this division is to assure sufficient personnel for all departments of the GUCK.

j. Administration of State Geodetic Control (UGGN: Upravleniye Gosudarstvennogo Geodezicheskogo Nadzora). The head of this administration in 1948 was V.N. Lysyuk. According to a source of 1952 (5) the UGGN includes the administrations of representatives of the GUCK in union and autonomous republics, and in other administrative geographical regions.

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A complete list of local representatives of the GUGK with defined limits of their jurisdiction has been found only in a source of 1940 (12) and is as follows:

1. Authorized Representative of the GUGK for UKRAINSKAYA SSR. Kiyev.
Ukrainskaya SSR
Krymskaya Oblast'
Moldavskaya SSR
2. Authorized Representative of the GUGK for BELORUSSKAYA SSR. Minsk.
Belorusskaya SSR
Smolenskaya Oblast'
3. Authorized Representative of the GUGK for GRUZINSKAYA SSR. Tbilisi.
Gruzinskaya SSR
4. Authorized Representative of the GUGK for ARMYANSKAYA SSR. Yerevan.
Armyanskaya SSR
5. Authorized Representative of the GUGK for UZBEKSKAYA SSR. Tashkent.
Uzbekskaya SSR
Turkmeneskaya SSR
Tadzhikskaya SSR
Kirgizskaya SSR
6. Authorized Representative of the GUGK for KAZAKHSKAYA SSR. Alma-Ata.
Kazakhskaya SSR
7. Authorized Representative of the GUGK for North Caucasus. Pyatigorsk.
Dzardzhikau Kray
Krasnodarskiy Kray
Rostovskaya Oblast'
Kabardino-Balkariya
Severo-Osetinskaya SSR
Dagestanskaya ASSR
8. Authorized Representative of the GUGK for the Leningrad Oblipolkom.
Checheno-Ingushskaya
Leningradskaya Oblast'
Vologodskaya Oblast'
Arkhangel'skaya Oblast'
Komi ASSR
Karelo-Finskaya SSR
Murmanskaya Oblast'

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9. Authorized Representative of the GUGK for the Novosibirsk Oblispolkom.
Novosibirskaya Oblast'
Omskaya Oblast'
Krasnoyarskiy Kray
Altayskiy Kray
10. Authorized Representative of the GUGK for the Khabarovskiy Krayispolkom.
Khabarovskiy Kray
Primorskiy Kray
11. Authorized Representative of the GUGK for Irkutskiy Oblispolkom.
Irkutskaya Oblast'
Chitinskaya Oblast'
Buryat-Mongol'skaya
Yakutskaya ASSR
12. Authorized Representative of the GUGK for the Gor'kovskiy Oblispolkom.
Gor'kovskaya Oblast'
Kirovskaya Oblast'
Ivanovskaya Oblast'
Tatarskaya ASSR
Udmurskaya ASSR
Mariyskaya ASSR
Chuvashskaya ASSR
13. Authorized Representative of the GUGK for the Sverdlovsk Oblispolkom.
Sverdlovskaya Oblast'
Chelyabinskaya Oblast'
Permskaya Oblast'
14. Authorized Representative of the GUGK for the Kuybyshevskiy Oblispolkim.
Kuybyshevskaya Oblast'
Chkalovskaya Oblast'
Mordovskaya ASSR
Bashkirskaya ASSR
15. Authorized Representative of the GUGK for the Saratov Oblispolkom.
Saratovskaya Oblast'
Stalingradskaya Oblast'
Voronezhskaya Oblast'
Kalmytskaya ASSR
Tambovskaya Oblast'
Penzhenskaya Oblast'

According to a source of 1952 (5) the representatives of the UGCN have control over all geodetic and cartographic work to be carried out in that region over which the representatives have jurisdiction. They are supposed to control work undertaken not only by the GUGK but also by other agencies.

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Representatives of the GUGK follow all geodetic and cartographic work done in their region and gather cartographic and geodetic material relating to this work. They are supposed to maintain complete up-to-date record (dezhurstvo) of all changes, of cartographic interest in their territory, such as names of populated places, roads, administrative boundaries, etc.

Further information on the role of the local representatives of the GUGK can be obtained from the secret instruction of the GUGK covering the regulations of topographic and geodetic work (13). We find that all agencies (with the specific exception of the Commissariats of Defense and of Navy) before they begin aerial surveying, or topographic work on scales of 1:10,000 and larger, must secure a permit from the local representatives of the GUGK. The representatives, after consideration of the plan of proposed work, must check with the staff of the military area (okrug) concerning the existence of secret areas and objects and the degree of their secrecy. If such objects exist in the territory to be surveyed the representatives of the GUGK issue permits only with the specific consent of military authorities.

k. Technical Division (Tekhnicheskiy Otdel). The chief of this division in 1948 was A.V. Rytov (6). This section is not mentioned in the statutes since it was not established until 1940 (12). The task of this division was formulated as follows:

- (a) development of problems of technical policy, formulation of instructions and directives for work
- (b) consideration of suggestions for improvement
- (c) consideration of inventions and issuance of patents
- (d) methodical guidance in the re-adjustment of geodetic network.

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1. Administration of Educational Institutions (Upravleniye Uchebnykh Zavedeniy). A detailed account of educational institutions may be found in Technical Paper No. 162 of this Laboratory. It describes the two Institutes of university level,

- (a) MIIGAik: Moscow Institute of Engineers of Geodesy, Aerial Surveying and Cartography.
- (b) Novosibirsk Institute of Engineers of Geodesy, Aerial Surveying and Cartography and
- (c) ten schools of intermediate training, topographic technicians in Kiev, Leningrad, Moscow, Novosibirsk, Semipalatinsk, Tashkent, Tbilisi, Tomsk, Chkalov and the Moscow Aerialphoto-Surveying School.

It should be noted here that the two major Institutes, formerly entirely in the system of the GUGK, are now in the system of Ministry of Higher Education (since March 1953, Ministry of Culture). Nevertheless, the GUGK exercises definite control over their Institutes.

m. The Secret Division (Sekretnaya Chast') of the GUGK obviously, is not mentioned in open source literature. Some information pertaining to the nature of its activities may be gleaned from the already quoted document (13). In all probability cartographic factories and aerogeodetic establishments also have secret sections. Secret divisions of the Administrations of Representatives of the GUGK are specifically mentioned in this document. In the enumeration of secret objects the following translation of Russian terms was adopted:

Sovershenno sekretno (literally perfectly secret): top secret

Sekretno: Secret

Dlya sluzhebnogo pol'zovaniya (literally for service use): restricted.

The instruction gives the following general rules:

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All persons who perform secret geodetic work must be cleared by the GUGB (Glavhoye Upravleniye Gosudarstvennoy Besopasnosti) of the NKVD (Chief Administration of State Security).

Plants of the defense industry, military storages, army camps, and dockyards should be surveyed only in their outline; interior details may be shown only if aerial photos or other materials are available. The above-named features should not be labeled on the map.

Radio stations, electric power stations, fuel storages, and railroad shops should be shown as ordinary houses and should not be labeled on the map.

If the outline configuration of any feature reveals its use, it should not be surveyed.

Dwellings and building at the airports and landing fields should be shown as ordinary houses. The outline and details of airports should not be surveyed.

It is forbidden to enclose radio stations, water towers, airport buildings, military storages, industrial plants and mines, and sea docks into triangulation or traverse networks.

It is forbidden to transmit the geodetic surveying information by radio, telegraph, radio telephone, television, wireless telegraph or telephone unless code or cipher is used.

Chapter "B" states general regulations for storage and delivery of secret geodetic matters and says that information classified as restricted may be stored in a wooden closet, which should be sealed up or stamped after daily work. A person without clearance can be permitted to have access to the restricted material by the head of the office.

All classified matters required for field geodetic work can be obtained only from the secret section of any office. These classified geodetic material should be stored in a steel closet or a strongbox. The room in which these materials are located should be separated from another compartment by an iron door and the windows of this room must have iron grills. Classified material which is to be destroyed must be destroyed as authorized by the head of the secret section of an office.

The security classification of geodetic and cartographic material is given as follows:

Top secret for all plans and maps which show fortified areas and positions of coast artillery.

The following materials are Secret:

1. All aerial photos, if they show plants of defense industry, airports and landing fields, hangars, dirigible berths, military radio stations, camps and polygons, bridges of lengths exceeding 40 meters, connecting or approach roads to military storehouses, powder magazines, fortified areas and also great industrial features (like Dneprogress, Volkhovgess, etc.), and tunnels. These restrictions also apply to coordinates of location of the above named features.
2. All plans and copies of the above-named features in all areas of the U.S.S.R.
3. All topographical maps of any kind for all of the U.S.S.R. of scales of 1:100,000 or larger, if they show in addition to the above-named features, elevators (for grain, etc.) located at railroad junctions and ports, railroads and their branch lines if they do not appear in the official railroad guidebook, oil pipe lines and water supply of

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cities, power lines to factory areas and cities, and camps of the NFVD (concentration camps).

4. All materials of triangulation and traverses if they include the above-named features as control points.
5. All maps, plans and plots of boundary areas and materials showing geodetic and surveying data of those areas.

The following materials are Restricted:

1. Topographic surveys for agricultural use (peat areas, timber areas, river surveys, etc.) if they do not exceed 5 square kilometers and if they are not included in triangulation or traverse networks.
2. Copies of topographical surveys if they do not include secret features.
3. Pilot's maps (charts) of navigable rivers, lakes and channels.

Unclassified materials are:

1. Graphical and analytical determinations of elements of reduction for geodetic work.
2. Results of instrument tests.
3. Copies of calculations of normal equations.
4. Copies of maps of several scales, of editions of 1917 and earlier, for countries adjoining the U.S.S.R.
5. Diagrams of cities without coordinate networks, if they do not show secret features.

2. The Mobilization Division mentioned in the statutes is naturally of a secret nature and no reference to it has been found in open-source literature. The remaining subdivisions: Sales Subdivision, Central Book-keeping Office, Labor and Wages Sector, Capital Construction Division, Administrative Affairs Office and Secretariat, are also not mentioned in the literature, but their functions are fairly clear.

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We have to consider two other subdivisions of the GUGK which are engaged in field work and production.

e. Administration of the Topographic and Geodetic Service (UTGS Upravleniye Topografo-Geodezicheskoy Sluzhby). The chief of this Administration in 1949 was N.T. Zavarza (14). The main subdivisions of this Administration are the Aerial-Geodetic Establishments (AGP, Aerogeodezicheskoye Predpriyatiye). As the name implies, work conducted by these establishments includes aerial surveying, photogrammetry and geodesy.

There are undoubtedly other subdivisions in the UTGS. In a recent reference, (15) for instance, both the Eastern Siberia Aerogeodetic Establishment in Irkutsk and the Irkutsk Geodetic Section (Irkutskaya Geodezicheskaya Chast') are mentioned. This is the only reference to "sections", but they may exist in other cities.

Similarly, the Central Computing Section (TsVCh, Tsentral'naya Vychislitel'naya Chast') was established in 1940 at the Moscow Aerial-Geodetic Establishment (12) but in the more recent literature (6) it is mentioned as being quite independent of that establishment.

(1) Establishments (Predpriyatiya). At one time or another (1940-49) the following establishments have been mentioned in the Soviet literature:

<u>LIST OF ESTABLISHMENTS</u>	<u>Last mention</u>
(a) Moskovskoye	1949
(b) Severozapadnoye (North-Western, in Leningrad)	1949
(c) Novosibirskoye	1948
(d) Sredne-Aziatskoye (Central Asia, Tashkent)	1948
(e) Ukrainskoye (Kiyev)	1948

<u>List of Establishments (Continued)</u>	<u>Last mention</u>
(f) Zakavkazskoye (Trans-Caucasia, Tbilisi?)	1949
(g) Severo-Kavkazskoye (North Caucasias, Rostov?)	1949
(h) Yakutskoye	1949
(i) Kolymo-Okhotskoye	1940
(j) Postoyannaya Polyarnaya Ekspeditsiya (Permanent Polar Exp.)	1940
(k) Kazakhskoye (Alma-Ata?)	1948
(l) Vostochnosibirskoye (Eastern Siberia, Irkutsk)	1948
(m) Zapadnoye (Western, Minsk?)	1948
(n) Yuzhnoye (Southern, Kiev)	1940

In all probability (e) and (n) are identical, (n) being the new name for (e). It is possible also that (i) and (l) are identical. On the other hand, (d) and (k) are mentioned in the same article (Sbornik NTIPS, Vyp. 22), so that they cannot be one and the same establishment.

All these establishments are large affairs, but obviously their size varies. In 1938 (M. Gurevich, Geodezist No. 4, 1940, pp. 57-59) about 600 automobiles and trucks were used by these establishments, 458 being used for field work.

The number of trucks and cars used in field work is as follows:

Moskovskoye AGP	177
Novosibirskoye	88
Sredne-Aziatskoye	87
Yuzhnoye	78
Severo-Zapadnoye	28

These figures may be assumed to indicate relative sizes of establishments as of 1938. Since only the above five AGP are mentioned in this

article, apparently only these existed at that time. We have definite knowledge that AGP-(j) came into being only in 1940, and AGP-(h) not until 1943.

In 1948 an order of the GUGK assigned the recomputation of all triangulation to the 1942 system to various AGP (6). Assignment was made on the basis of polygons which, in Soviet terminology, means loops, the sides of which extend along parallels and meridians for distance of from 120 to 150 kilometers. These polygons have a definite Soviet numeration which has not been reconstructed from the literature. The assignment appears to be on the territorial principle; that is, various AGP groups adjust those polygons which fall into their own territory.

The following list is the Soviet index to their polygons, in which the letters following the number of the polygon denote the establishment charged with the work on that polygon as given in the list of establishments above. (The designation aa refers to the Central Computing Department (Tsentral'naya Vychislitel'naya Chast') in Moscow, as distinguished from the Moscow AGP.)

LIST OF POLYGONS

1b	2a	3a	4b	5b	6b	7b	8b	9a	10a	11a	12a
13	14a	15e	16e	17e	18aa	19a	20b	21aa	22a	23aa	24a
25aa	26aa	27e	28e	29e	30b	31b	32a	33a	34	35a	36a
37a	38	39	40g	41g	42g	43g	44f	45b	46a	47a	48a
49a	50b	51aa	52aa	53c	54aa	55d	56d	57d	58d	59aa	60aa
61d	62aa	63c	64d	65c	66aa	67d	68d	69d	70c	71c	72d
73c	74c	75c	76c								

In the above index polygons 13, 34, 38 and 39 are not assigned. On the other hand, polygon 19 is assigned both to a and b, polygon 31 is

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assigned both to b and e, and in the assignment to the Moscow AGP, polygon 24 is mentioned twice. This latter is undoubtedly a misprint and one of the No. 24's should probably read 34. Similarly, one of the No. 31's should probably read 13, and one of the No. 19's should read 39. This still leaves No. 38 unaccounted for.

(a) Structure of Establishments. The structure of an AGP is very complex and as yet not perfectly understood. The following subdivisions are mentioned (14).

- (1) expeditsii (expeditions)
- (2) otryady (parties)
- (3) brigady (brigades)
- (4) tsekhi (departments)

From the context of various reports, and with no great assurance as to the validity of our interpretation, it appears that the first three subdivisions have to do with field work (polevaya rabota), the last one with laboratory work (Kameral'naya rabota). Larger parties sent out by the AGP are expeditions. The brigades are certainly smaller subdivisions than parties.

In an article of 1940 (15) the structure of the AGP is discussed in relation to topographic work. Since this organization was found to be cumbersome, some recommendations for simplification were offered:

- (1) Letnyy otryad (aerial surveying party).
- (2) Otryad po osnovnym geodezicheskim rabotam (party for fundamental geodetic work).
- (3) Topograficheskiy otryad (topographic party).
- (4) Fototriangulyatsionnyy tsekh (phototriangulation department).
- (5) Fototsekh (photo-laboratory department).

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- (6) Fotogrammetricheskiy tsekh (photogrammetry department).
- (7) Stereofotogrammetricheskiy tsekh (stereophotogrammetry department).
- (8) Kartosostavitel'skiy tsekh (map compilation department)
- (9) Chertezhnyy tsekh (drafting department).

Such was the set-up in 1940. The authors were associated with the Severo-Zapadnoye AGP but described the above organization as being typical of all of the AGP's. However, this is evidently not a complete picture since more recent literature describes:

- (10) Vychislitel'nyy Tsekh (Computation department)
- (11) Geograficheskiy Tsekh (Geographic department)
- (12) Stereotopograficheskiy Tsekh (Stereotopographic department)

No. (10) above is mentioned (Sbornik NTiPS, Vyp. 24, 1949, p. 5-8) in connection with AGP (a), (b), (c), (e), (f), (g), (see List of Establishments); No. (11) above is mentioned (Sbornik NTiPS, Vyp. 16, 1948, p. 57) in connection with AGP (c) and (d), and No. (12) is mentioned (ibid., p. 87) in connection with AGP (a).

It is quite possible that in the smaller AGP offices the structure is simpler and number of subdivisions smaller.

Some insight into the work of an AGP is given in an article by G.E. Levadnyy, head of the Yuzhnoye AGP (16). It was found that field parties, (Otryady) returning to Kiyev, lost much time in transportation and delivering their work to various departments for processing and soon lost contact with it. To improve this situation permanent parties were organized at Khar'kov, Kiyev, Rostov, Saratov and Tbilisi. To each party were assigned brigades: computing, drawing and cartographic; that is, duplicating the tsekh (8), (9) and (10) of the above scheme of the parent institution.

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Since these groups were subordinate to the party (otryad) they were not called tsekh but brigada. It is also noteworthy that the jurisdiction of the Yuzhnoye AGP in 1940 extended over the entire southern part of the U.S.S.R. rather than over the Ukraine alone. Apparently this AGP split after the war into three independent AGP: (e), (f) and (g).

The number of people employed in each AGP must be very large, certainly several hundred people, and perhaps as many as 1,000 in the Moscow AGP. We have definite references (6) to topographic party No. 68 of the Severo-Kavkazskoye AGP, and to geodetic party No. 37 of the Severo-Zapadnoye AGP. If we assume that each party consists of ten people, we have in the first case 680 and in the second, 370 employed in field work alone in 1948.

There is no thorough description of the origin, organization, history, etc. available for any of the establishments. Several articles have been found which describe certain aspects of activity of the establishments and there are, of course, numerous references to them in geodetic literature. The more extensive descriptions are for the following:

(1') Moscow AGP (Moskovskoye Aerogeodezicheskoye Predpriyatiye). The head of the Moscow AGP in 1948 was Pavlovskiy (probably one of the members of the Collegium of the GUGK). He was mentioned in connection with an award of (17) the Order of the Red Banner to the Moscow AGP for excellence of its work.

The following Laboratories of the Moscow AGP have been mentioned:

Experimental-Research Laboratory (Opytno-Issledovatel'skaya Laboratoriya) the head of which was P.I. Izmaylov in 1949 (4). A 1948 source states that all large AGP and some cartographic factories had such laboratories established in 1948 (18). The function of the laboratory is what the Soviets

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call "rationalization" of production; that is, improvement of organization, introduction of more efficient mechanical procedures and methods, etc. The laboratory considers all suggestions for improvement of proposed inventions, new instruments and methods and publishes annual accounts of such, which are later combined into a report covering the activities of all AGP's in the GUGK.

Gravimetric Laboratory (Gravimetricheskaya laboratoriya) is mentioned in a source of 1949 (19). Experiments in the temperature control of pendulums were conducted by this Laboratory and some special thermometers constructed. Gravimetry appears to be an important item in the work of the Moscow AGP. At least it was so before 1940. Between 1932-1940 no less than 4,060 pendulum gravimetric determinations were made (20) by this AGP and in 1936, fourteen gravimetric parties were sent out (21).

Since 1935 the Moscow AGP has published its own reports on the triangulation of 1st and 2nd order (Otchet po Triangulyatsii I i II Klassa ispolnennoy MAGP) (22). These appear to be distinct from similar reports covering the activity of all AGP's, and published by the TsKGF (as explained above).

Undoubtedly the activities of the Moscow AGP are manifold and are not restricted to actual surveying. We learn, for instance, that this AGP in 1949 began to manufacture its own silver bromide photographic plates since the available plates of this type were not completely satisfactory (23).

Stereotopographic work of the Moscow AGP is described in some detail in a source of 1946 (24). The special department set up for this work (Stereotopograficheskiy Tselkh) was organized in 1937 and the mapping up to 1946 was done on scales of 1:50,000 and 1:100,000. Work on maps of scales

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of 1:25,000 and 1:10,000 was just beginning in 1946. Area coverage per year is given in the following table:

AERIAL PHOTOGRAPHY COVERAGE BY MOSCOW AGP
IN SQUARE KILOMETERS

Year	1937	1938	1939	1940	1941	1942	1943	1944	Total
1:50,000	1,382	7,230	19,450	16,925	16,343	20,560	6,230	-	88,120
1:100,000	-	-	-	-	36,762	20,551	57,028	52,432	<u>166,773</u>
							Total		254,893

The most detailed account of the activity of the Moscow AGP has been found covering the period only up to 1939. It is described as one of the largest in the system of the GUGK. The following table represents its scope of activity:

Type of Work	1935	1936	1937	1938	1939(plan)
Observations I and II class	--	288	264	482	538 points
Leveling I and II class	--	3405	4274	6347	5765 km.
Geodetic control for	--	32595	48800	106449	140807 sq.km.
Topographic work	4902	15220	28800	108449	128787 sq.km.
Prepared photo-maps 1:10,000	--	15407	38792	56863	- sq.km.
Prepared photo-maps 1:40,000	--	1095	2905	91701	117800 sq.km.
Maps issued	9960	7380	13421	56667	100088 sq.km.

One strange feature of this table, not explained in the text, is why maps of a 1:10,000 scale, based on aerial surveys, were abandoned in 1939.

The AGP was called upon in 1937-38 to do considerable work in connection with the survey of the territory for the Kuybyshev hydroelectric development.

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The increase in personnel required to carry out astronomic and gravimetric work is described in detail in this reference. Work in Sakhalin and along the Arctic seaboard is mentioned. Evidently there was a serious problem of housing employees which was supposed to be solved in 1939 by the construction of four apartment houses. The housing shortage would have been worse if the AGP had not maintained special branches in Torzhok, Kuybyshev, Kazan', Ufa and Yelets.

There are no figures given of the number of people employed. However, in the same volume of Geodezist, p. 12, there is a statement that by January 1, 1939 this AGP had 287 "stakhanovites" or workers, overfulfilling their quota.

The laboratories are said to be equipped with U.S.S.R. instruments "not inferior in quality to the best instruments of Zeiss".

(2') Northwestern AGP (Severo-Zapadnoye AGP in Leningrad). The activity of this AGP is described in considerable detail but refers to the period up to 1939 (26).

This AGP was created in 1931, but in the first period of 1931-37 there was not much planned effort in the organization. Astronomic and geodetic work was carried out in small territories scattered all over the U.S.S.R.: Karelia, the Far East, Lenn regions, Buryat-Mongolia, etc.

In 1937-38 definite plans for work were adopted. The AGP was called upon to furnish geodetic information for the Solikamsk, Kama-Pechora, Volgastroy and other hydroelectric developments. In this connection a program to cover the whole of the northern portion of European U.S.S.R. to the Barents Sea with surveys of 1:100,000 and 1:200,000 was developed.

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Emphasis was definitely on the production of maps from aerial photography. The following figures are given:

<u>Year</u>	<u>Production of photo-maps</u>
1932	16.0 thousand sq.km.
1933	9.5
1934	13.3
1935	28.9
1936	18.0
1937	64.0
1938	69.9

Replacement by 1938 of imported apparatus used for aerial surveys, by the apparatus constructed in the U.S.S.R. is emphasized.

The head of the Northwestern AGP in 1948 was Grunin and the chief of the cartographic section was Yermuzevich. This AGP was awarded the order of the Red Banner for excellent work in 1948 at the same time as similar awards were made to the Moscow and Novosibirsk AGP (17). In this source the Optical Laboratory of the Northwest AGP is named as the place where the multiplex and other instruments for photogrammetry are constructed.

This AGP is also manufacturing its own photographic plates (23).

Stereotopographic work of the Northwest AGP is described in some detail in a publication of 1946 (27). The work was done exclusively on a scale of 1:100,000. During the years, 1938-1944, 424,500 sq. km. were covered. For the years 1942-1944 the following figures of coverage are given:

1942	55,045 sq. km.
1943	115,000
1944	<u>85,181</u>
Total	255,226 sq. km.

This work was carried out under the difficult conditions of a besieged city, and it considerably exceeds that of the Moscow AGP. Some idea of the size of the Northwestern AGP may be obtained from an article of 1939 which analyzes the reasons for unsatisfactory work of this AGP (28). The trouble was found to be poor living conditions which is the reason that in seven months in 1939, 13 engineers and 117 technicians left the AGP. In order to carry out its assigned work the Northwestern AGP estimated a required increase in staff to over 300 engineers and technicians.

Both the Moscow and the Northwestern AGP, because they were the largest and best equipped of all the AGP, were apparently called upon to help less efficient establishments. In the same source (17) where the work of these two AGP is highly praised we find a statement to the effect that neither could complete in time topographic maps of the Yakutsk area but the blame is placed on the Yakutsk AGP which did not send out the necessary material on time.

(3') Novosibirsk AGP (Novosibirskoye AGP). The head of this AGP in 1948 was Ghudinov, and the chief of the stereo-topographic department, Avilov. It was admitted that in 1948 topographic surveys assigned to it were not completed on time, but the work of this AGP is highly praised and the order of the Red Banner is awarded to it (17).

Stereotopographic work of this AGP is described in a publication of 1946 (29) but no data as to the coverage achieved are given.

(4') Central Asia AGP (Sredne-Aziatskoye AGP, Tashkent). The work of this AGP was severely criticized in 1948 (17): "the altitude control was unsatisfactory, triangulation work lagging, and the compilation of maps was done carelessly." On the whole it was found

that the Central Asia AGP did not pay sufficient attention to government directives.

(5') Ukrainian AGP (Ukrainskoye AGP in Kiyev).

The work of this AGP was criticized in 1948 (17) on the same grounds as that of the Central Asia AGP. It was noted that the aerial surveying work of the Ukrainian AGP was much behind schedule.

(6') Trans-Caucasian AGP (Zakavkazskoye AGP in Tbilisi). The work of AGP in 1948 was also not considered satisfactory in 1949 more or less on the same grounds as those for the preceding AGP (17). The head of this AGP in 1946-48 was E.A. Zaliyev (until his death) (30). This AGP has an experimental research-laboratory (described under the Moscow AGP).

(7') North Caucasus AGP (North Caucasus AGP, Rostov?) Nothing has been found on this AGP, but it undoubtedly existed in 1948 (17).

(8') Yakutsk AGP (Yakutskoye AGP, Yakutsk). This AGP also came in for criticism in 1948 (17). It was found that the amount of rejection of laboratory and field work was very high indicating insufficient supervision. Moreover, the Yakutsk AGP evidently could not carry out all of its work and some of its material was not sent on time to the Moscow and Northwestern AGP for further work.

The titles of the following divisions are given in this report: Laboratory work, (Kameral'noye proizvodstvo): stereotopographic section: Starodubov, Burmistrova, cartographic section: Ostrovskiy.

This AGP is specifically mentioned as having an experimental-research laboratory (described in connection with the Moscow AGP). Its chief, in

1948 was V.D. Kapustin and the chief engineer, Ya. P. Loparev (6).

A detailed report on the activity of this AGP covering its activity in 1935-1944 is available (31). It was organized in 1942 to accelerate the mapping of Yakutia which was then in a deplorable state with positional errors on the 1:1,000,000 map of as much as 30 to 40 kilometers. Despite the war, aerial surveying for this 1:100,000 map was organized on a large scale, including several large expeditions of which one is mentioned by name, Verkhoyanskaya. The only other expedition referred to is No. 73. If this numeration of expeditions is within the AGP under consideration, very large scale cartographic work is indicated. It is, of course, possible that No. 73 refers to expeditions sent out that year by all the establishments. At any rate expeditions of the Yakutskoye AGP were complex and larger affairs consisting of a number of parties, (Otryady) some of which are mentioned in the article:

- (1) Aerial surveying involving hydroplanes and field photolaboratories.
- (2) Astronomic determinations of III and IV class.
- (3) Leveling of II class.
- (4) Determination of altitude control for photogrammetry.
- (5) Geographic exploration.
- (6) Gravity survey.

If the number of people in each party averaged 10, the total number of people engaged in each expedition would be about 60. If there were indeed 73 expeditions, the number of people engaged in field work was at least 436.

Landings of hydroplanes were made on rivers and lakes of which there are over 100,000 in Yakutia. This necessity of using open water restricted

the period of operations to the summer months, the season least favorable from the aerological point of view, so that there were probably not more than ten days adequate for aerial surveying during the entire year.

The home office of the AGP organization was very rudimentary (as is pointed out in the report) and consisted only of a photolab and two sections, (tsekh): stereophotogrammetric and cartographic.

Of the details contained in this report the following are of interest:

- (1) Special attention to gravimetry.
- (2) Leveling of II class across the Verkhoyanskiy ^{khrebet} Krhebet to connect the Arctic and the Pacific Oceans.
- (3) Very good agreement of altitudes obtained by triangulation and by aneroid barometers, the average discrepancy being 3.2 meters.

(9') Kolyma-Okhotsk AGP (Kolymo-Okhot'skoye AGP), presumably in Magadan. This AGP definitely existed in 1940, but is not mentioned in the literature since that time. Such a group would probably take care of the territory between the Kolyma River and the Okhotsk Sea; that is, the territory connected with the Dal'stroy with its concentration camps. In the report of the activity of the UTGS for 1939, this AGP is mentioned among the rest but no data on its activity are given (32). Perhaps the GUGK did not exercise full control over the Kolyma-Okhotsk AGP. From a report covering the first half of 1940 (33) nothing can be concluded except that triangulation of II class, leveling of I and II classes, and aerial surveying was being carried on here.

(10') Permanent Polar Expedition (Postoyannaya Polyarnaya Ekspeditsiya). This organization is counted as one of the AGP, but nothing is known of its work except for the years 1939-40 (34), and

it is not known whether it functioned after 1940. On the other hand, we have definite evidence that AGP (1'), (2'), (3'), and (8') as enumerated above, carried on some work in the Arctic regions. Perhaps this establishment existed for a few years only and then was disbanded.

In 1939 it was organized to carry out aerial surveying in the Arctic where two organizations of the Glavsevmorput', the Hydrographic Office and the "Aeros"yemka", had already failed. In 1939, the "Aeros"yemka" was transferred to the GUGK and re-organized as an AGP.

The work in 1939 consisted in aerial surveying of the delta of the Lena river. The literature points out the fact that the maps of the delta dated 1933 (Romanov) and 1939 (Arctic Institute) are very schematic and based on a collection of miscellaneous data. Hydroplanes were used for this survey and the troubles of this expedition were of the same nature as troubled the AGP-(8'). During the working period, (middle of June-middle of September) the expedition had only one perfect day for aerial surveying. Altogether 27.6 hours of aerial mapping time were used to cover the area of 39,261 km².

Control consisted of sixteen old astropoints and eleven new astropoints marked off on the ground and to be established later. The data thus obtained is considered by the Soviets as adequate for a map on the scale of 1:100,000.

(11') Kazakh AGP (Kazakhskoye AGP). This is one of the newer AGP's and nothing is known about it except for two references (35) indicating that the quality of its work was not very high. In the first half of 1948 it fell behind the plan by failing to determine 19 points of triangulation and 60 klm. of leveling. It is probably located in Alma-Ata.

(12') Eastern Siberian AGP (Vostochnosibirskoye AGP in Irkutsk). This AGP is also one of the newest in the system. We have only two references to it for 1948 and 1949 (17, 36) and nothing is known of its activity.

(13') Western AGP (Zapadnoye AGP), presumably in Minsk. It is mentioned several times in the more recent literature but it did not exist before 1940 apparently. In 1948 its chief engineer was A.S. Semenov, commended for his work (4).

(14') Southern AGP (Yuzhnoye AGP in Kiyev or Khar'kov). It is practically certain that some time after 1940 this establishment was split into three parts, organized according to republics, thus introducing (as in Central Asia) the political rather than regional principle of organization. Before 1940 the Southern AGP was very active serving the whole area south of parallel 52° N in the European part of the Union. From a report written by the head of this establishment (37) we learn of the existence of permanent parties (see above) located at Khar'kov, Kiyev, Rostov, Saratov and Tbilisi. In 1939 maps covering an area 85,700 km.², including 13 sheets of the map 1:100,000, were prepared for publication here.

p. Administration of Cartographic Industry (UKP: Upravleniye Kartograficheskoye Promyshlennosti). The main components of the UKP are cartographic factories.

(1) Cartographic Factories. The name Cartographic Factories (Kartograficheskoye Fabrik, abbreviation Kartfabrik) would seem to imply a printing establishment whose sole purpose would be to produce maps, but this is certainly not correct in all cases. Much more than map printing

is done in at least some of these factories. Thus, the journal, "Geodezist", was printed at the Poligrafkombinat, and Sbornik NTIPS is being printed at the Riga cartographic factory. There is also evidence that some instruction and research is being done at some factories.

The difficulty of deciphering the system of cartographic factories lies in the Soviet usage of referring to these factories either by name or by the number, but very seldom by both name and number at the same time. The numbers assigned to factories appear to be permanent yet some inconsistencies are evident.

The list of the factories as given in a source of 1940 is as follows:

	<u>Latest mention</u>
No. 1 - Leningrad Kartfabrika	1953
No. 2 - Poligraf Kombinat im. Molotova (Moscow)	1948
No. 3 - Minsk Kartfabrika	1940
No. 4 - Khar'kov "	1940
No. 5 - Tashkent "	1949
No. 6 - Omsk "	1950
No. 7 - Sverdlovsk "	1949
No. 8 - Tbilisi "	1949
No. 9 - Saratov "	1940

This numeration seems to be standard, yet in the same year we find Cartographic Factories No. 1, 5, 7, 9 consistent with the above scheme, but No. 8 is assigned to Arkhangel'sk instead of to Tbilisi. Perhaps the Arkhangel'sk factory was discontinued at about that time and transferred to Tbilisi.

There are, however, at least three more cartographic factories which

were established more recently. Their Soviet-assigned numbers are not known but we shall denote them here provisionally as No. 10 - No. 12:

		Latest mention
No. 10	Riga	1953
No. 11	Kiyev	1953
No. 12	Novosibirsk	1949

An article dated 1939 describes these factories as of 1934 (40) as follows:

	No. of Rotary Offsets	No. of Flat-Bed Presses	No. of Lith. Machine	Capacity in 1000 sheets
No. 1 - Leningradskaya (Leningrad)	1	3	16	23,940
No. 2 - Moskovskaya (Moscow)	2	-	16	27,720
No. 3 - Sredne-Aziatskaya (Tashkent)-	-	-	2	2,520
No. 4 - Ural'skaya (Sverdlovsk)	-	-	1	1,260
No. 5 - Sibirskaya (Omsk)	-	-	1	1,260
No. 6 - Zakavkazskaya (Tbilisi)	-	-	1	1,260
No. 7 - Sredne-Volzh. (Saratov)	-	-	1	1,260
No. 8 - Belorusskaya (Novobelitsy)	-	-	1	1,260
No. 9 - Ukrainskaya (Khar'kov)	-	-	6	7,560
Total	3	3	45	68,940

Notice that the numeration of factories here, except for Nos. 1 and 2, varies from that given in the preceding table. Apparently at that time the notation was not yet standardized. The rate of development of the cartographic industry can well be illustrated by the fact that Factory No. 1 in 1937 issued 77,000,000 sheets, more than the total produced by the nine factories in 1934.

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In 1936 factory No. 8 (Novobelitsy) was transferred to Minsk and thoroughly reorganized. Ten lithograph machines were added to the single unit already available there.

The development of the factories is shown by the following figures indicating the number of different presses in operation:

Second Five-Year Plan

<u>Type of Press</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>
Flat-bed press	17	45	42	30	28
One-color offset press	1	3	3	5	7
Two-color offset press	-	-	-	17	24

In the 3rd five-year plan (1938-42) available figures refer only to the year 1938 and 1939. For 1940-42 the figures may have been affected by the war.

Third Five-Year Plan

<u>Type of Press</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>
Flat-bed press	33	30	28	26	26
One-color offset press	5	6	6	6	6
Two-color offset presses (imported)	22	23	23	23	23
Two-color offset presses (U.S.S.R.)	2	10	14	19	24

Offset presses manufactured in the U.S.S.R. thus appeared first in 1938 but by 1942 they were supposed to predominate. These presses were made in a factory in Rybinsk.

Increase in the rate of production is given in two diagrams which, if combined, result in the following production figures:

<u>Year</u>	<u>Production</u>
1935	100
1936	144
1937	258
1938	477
1939	480
1940	516
1941	555
1942	556

This rate of increase of production was considered so satisfactory that by a decree of the SNK of September 16, 1938 "The famine of maps for instructional purposes was defeated".

Among other measures taken during this period, one is of particular interest. This occurred when the paper mill, "Mayak Revolyutsii", in the city of Penza was assigned to the GUGK for the sole purpose of manufacturing paper according to the specifications especially designed for use as maps.

In the 3rd Five-year plan, (1937-42) a new cartographic factory was opened in Novosibirsk.

All flat-bed presses were to be replaced by offsets. Living quarters for factory workers were to be constructed in Moscow, Novosibirsk, Tbilisi and Tashkent.

Finally, the Central Cartographic Laboratory at the 2nd factory (Moscow) was to be transferred to the N.-I. Institute of Geodesy and Cartography.

As to the detailed organization of cartographic factories, no recent information is available. In the source of 1952 (5) dealing specifically with the technical side of cartography, not one Soviet factory is named, and the only information concerning the organization of cartographic factories

is the statement of the existence of Cartographic Information Bureaus (KSB: Kartograficheskiye Spravochnyye Byuro) at each factory. These bureaus are supposed to collect cartographic information in the region assigned to them. Undoubtedly, as seen from the description of the Tbilisi factory given below, there are numerous subdivisions in each factory. Large factories like those in Moscow and Leningrad have some research laboratories attached to them.

Each factory has a Section of Technical Control OTK, (Otdel Tekhnicheskogo Kontrolya) with a corps of inspectors who pass upon the quality of production (41). From a source of 1949 we learn that after the inspection of the new map by OTK, technical editor and the chief engineer of the factory, sample sheets must be sent to the Bureau of Censorship (Glavlit). No copy of a new map may leave the factory without the written authorization of the Glavlit.

In the 18 available volumes of the Great Soviet Encyclopedia (1949-53) about half of the maps appearing bear identification marks of cartographic factories. (Riga, Kiyev and Leningrad) But many of the maps in the Encyclopedia were printed at the Dunayev Factory (Fabrika im. Dunayeva) and a few at Goznak.

The Dunayev Factory does not appear to belong in the system of the GUGK. The only information about this factory is as follows, It is in Leningrad and in 1929-32 was known as "Geokartprom" (Geodetic Cartographic Industry). It is quite distinct from the Leningrad Cartographic Factory No. 1 which, in the same period, was known as "Goskartgeodeziya" (40). The Dunayev Factory is never mentioned in connection with the GUGK; nevertheless, all maps published by this factory were compiled and edited at

the NRKCh of the GUGK. Either it was included in the system of the GUGK quite recently (since 1951) or it serves some other agency such as the Military Topographic Administration (VTU).

The Goznak is also described in the 1940 source as publishing some maps in Leningrad. The Goznak (abbreviation for Gosudarstvenny Znaki: State Decorations) is a large organization attached to the Ministry of Finance whose primary purpose is the printing and coining of money, certificates, decorations awarded for distinction, etc. Apparently at its Leningrad section it has a well equipped cartographic production.

DESCRIPTIONS OF INDIVIDUAL FACTORIES

No. 1 - Leningrad Cartographic Factory (Leningradskaya Kartfabrika, Leningrad, Pryazhka 5)

This is one of the oldest and most active factories, referred to continuously in Soviet literature up to 1940. The only subsequent mention of it occurs in 1948 (42).

A rather detailed description of the Leningrad Factory appears in an article by S.G. Milenki (43). The factory is the development of the old Cartographic Establishment of A. Il'yin which was founded in 1859. In 1910 this factory employed 75 people. The first offset presses were received here in 1929 and the number of people employed increased very markedly. The following figures are given:

	No. of workers	Sheets produced in thousands	Value of one worker per year in rubles
1935	659	54,236	7,708
1936	690	64,329	16,208
1937	603	76,002	18,758
1938	596	134,662	42,369

These figures refer to "workers". Whether they include management, etc., is not clear from the text. Production increased very rapidly from year to year. The slight drop in the number of employed workers is probably due to the greater productivity of individual workers. The normal employment of the factory may be assumed to be in the neighborhood of 600.

After the period of "sabotage", etc. (1933-34) the factory started developing very rapidly. In 1936 the factory received two-color offset presses and began two-shift and even three-shift work. Increase of personnel was due to the influx of young workers as well as to "the return to the factory of older workers". This last sentence probably means those workers who were accused of sabotage in 1933-34.

In 1937 a new building was erected for the printing department and new equipment imported from abroad. To solve the problem of the necessary personnel to use these machines, an apprenticeship system was introduced. In six to nine months the necessary number of young workers were trained.

7 No. 2 - Moscow Cartographic Factory (Poligraf Kombinat im. Molotova, Moscow, Yaroslavskoye Shosse 97)

The complete Russian name is Poligraficheskiy Kombinat Imeni V. M. Molotova; that is, Polygraphic Combination, presumably doing all types of graphic work. It is supposed to be the best equipped factory employing the most modern methods of production. In 1948 it was described as the best equipped and the most productive cartographic factory in the world (42).

The Leningrad Map Compilation Division (Leningrad Kartchast') has some connection with the Leningrad Cartographic Factory. This is quite similar to the NRKCh (Scientific Editing and Map Compilation Division). We learn, for instance, (44) that the Pocket Atlas of the U.S.S.R. was

compiled and set up by the 'Lenkartchast' but printed at Kartfabrika No. 1 in Leningrad. From this and other references it would appear that the 'Lenkartchast' has some sort of research relationship to Kartfabrika No. 1.

Further details of this factory are given in an article by Z. B. Kravchinskiy of 1939 (40). At the end of 1938 this factory and NRCh were transferred to a new building (photo of this building) and equipment was increased by offset presses manufactured in the U.S.S.R. and it became "the largest cartographic establishment in the world". In 1939 equipment was further enlarged and the main product of that year was Volume II of the Great Soviet Atlas of the World. Historic, reference and administrative-political maps were also printed in large numbers there.

This factory is described as the "model cartographic factory" establishing all sorts of records. Thus, in 1938, when the Papanin crew which had been adrift in a floating ice pack returned to the U.S.S.R., a map of the Arctic in 6 colors and 100,000 copies is said to have been compiled and printed within 60 hours.

No. 3 - Minsk Cartographic Factory (Minsk Kartfabrika). This factory was either badly damaged or wholly destroyed during the war. No reference to it has been found in Soviet literature after 1940.

No. 4 - Khar'kov Cartographic Factory (Khar'kov Kartfabrika). The situation here is analogous to that of No. 3. The factory in all probability was transferred to Kiyev after the war.

No. 5 - Tashkent Cartographic Factory (Tashkent kartfabrika). There is no recent information available about this factory but it certainly existed in 1949. In that year an engineer-cartographer on the staff of this factory received decorations for excellence of work (4).

No. 6 - Omsk Cartographic Factory (Omskaya Kartfabrika)

We have a rather detailed description of work in 1940 by N.I. Kochergov, the director (45). In 1940 refresher courses were set up for 82 people of technical personnel. There were also 19 pupils trained by experienced workers. The factory then must be quite large, at least some 300 people. Map 1:1,000,000 North of European U.S.S.R. was printed in 1948 at Factory No. 6, presumably at Omsk. Responsible editor was M. A. Yakimova, Technical editor A. N. Gus'kova. School map of Ural Region, 1:1,000,000 was published in 1950 with a definite statement Kartfabrika No. 6, Omsk. Responsible editor is the same, but technical editor this time is O.V. Strunina. In 1949 several employees of this factory were awarded decorations (4). Two of them were women engineer-cartographers.

No. 7 - Sverdlovsk Cartographic Factory (Sverdlovskaya Kartfabrika Sverdlovsk, Krasnoarmeyskaya Ul., No. 92)

An Atlas of the U.S.S.R. for high schools was published here in 1950. There is no number attached to the factory. Among the employees receiving decorations in 1949, there were two women: chief of the compilation section, O. N. Plynsnina and chief of the graphic section, M. K. Sepul'nik (4).

No. 8 - Tbilisi Cartographic Factory (Tbilisskaya Kartfabrika)

A detailed description of the activity of this factory up to 1939 is given in an article by S. Tatulov (46). The development of cartographic work in Transcaucasia, involving the Tbilisi factory, is given by N. Shlepnev, also of the same year.

The Transcaucasian Geodetic Administration (Zakavkazskoye Geodezicheskoye Upravleniye) was organized in Tbilisi in 1929. It had a small cartographic section, which in 1930-31, compiled a map of Transcaucasia, scale 1:500,000, printed in Leningrad.

Printing of maps in Tbilisi began in 1932 when some German-made equipment was received. The Factory itself was organized in 1933. Its first job was to compile a topographic atlas, scale 1:200,000, of Transcaucasia in 44 sheets. It was printed in Moscow in 1934-35.

Further development of the factory occurred in 1935 when new equipment was received and the staff enlarged.

In 1936-37, there was much "sabotage", etc. In 1938 the factory was completely reorganized. Young "experts" took over the management. Of these, engineer-cartographers M. Z. Pavlov, N. A. Suzdal'skiy, V. I. Arz-amastsev and S. N. Ter-Grigoryan are mentioned.

The printing of maps in Georgian, Armenian and Azerbaydzan languages is stressed in the Soviet literature as a special achievement of this factory.

The following departments (tsekh) are mentioned:

Kartosostavitel'skiy (map compilation)

Lithografichiskiy (lithographic)

Pechatnyy (printing)

Perevodnyy (transfer)

Gravernyy (engraving)

Steps were taken to increase the qualification of workers. In 1938 a ten-month school was established in cartographic drafting in which 25 people were enrolled. Those of this group who excelled were then promoted to more responsible positions. The case of a former guard in the factory is quoted. This guard showed ability in photography and was promoted to the rank of assistant photographer. He was later sent for additional training to the 2nd Cartographic Factory in Moscow for a period of four months and on his return to Tbilisi was appointed as a photographer.

Finally, a complaint is made on the inadequate housing for the factory workers.

The number of people employed in this factory is not known exactly but must run into several hundred. There are 54 names mentioned in the text. Of these, 35 or nearly two-thirds, are Russian names, the rest are Georgian, Tatar, etc. This predominance of Russians even in a factory where much production is in native languages is surprising.

Among the 17 most important maps published by this factory 1933-40 the following are of interest:

- (1) Geographic Atlas of Georgia, scale 1:600,000, 15 sheets organized according to geomorphological regions.
- (2) Map of Georgia, scale 1:200,000, 12 sheets.
- (3) Map of the Caspian Depression (Kura-Araks Lowland), Scale 1:100,000, 30 sheets.

No. 9 - Saratov Cartographic Factory (Saratovskaya Kartofabrika).

There is no recent information on this factory and it is not certain that it now exists.

No. 10 - Riga Cartographic Factory (Rizhskaya Kartfabrika, Riga, B. Altonavas No. 43).

This is a new and very active factory. Besides publishing maps, (Geograficheskiy Atlas SSSR, 1951) all recent books, reports, periodicals, etc., of the Geodezizdat are printed here. The work of the factory in 1948 was reviewed unfavorably, however, when it was found that paper wastage amount to 23.6 percent instead of the 10.9 percent allowed by regulations (17).

No. 11 - Kiev Cartographic Factory (Kiyevskaya Kartfabrika)

Nothing is known about this factory, but the 1:1,000,000 map of Eastern European Russia was published there in 1950. Presumably it is the same factory that was located in Khar'kov before the war.

No. 12 - Novosibirsk Cartographic Factory (Novosibirskaya Kartfabrika)

Three maps on the scale of 1:5,000,000 were published here about 1948. The factory is severely critized in a report of 1948 (17). The percentage of idle time was 25.4, against the planned 9.3%. Also, paper wastage is indicated.

3. Analysis of the Structure of the GUGK

Factual information concerning the work of the GUGK is very abundant up to 1940 but after this period it is largely non-existent. This fact allows us to make only the most cautious generalizations as to the over-all and present structure of the organization.

a. Size. The first and most obvious fact is the tremendous size of the GUGK. We have data on which to base this conclusion from a definite statement (48) concerning the number of engineering and technical personnel, (inzhenerno-tekhnicheskiye rabotniki) as follows:

<u>Year</u>	<u>Personnel</u>	<u>Topographic Coverage</u>	<u>Triangulation</u>
1924	469	30,000 sq. km.	182 points.
1940	5,058	600,000 sq. km.	5,405 points.

Such "personnel" would presumably include both engineers holding a higher education diploma and technicians who are graduated from a technicum, but would not include ordinary workmen, supervisors, foremen, etc., or office personnel, stenographers, typists, etc. Considerable improvement in efficiency is noteworthy; personnel between the years 1924 and 1940 increased 11 times, while the annual topographic coverage increased 20 times and the determination of triangulation positions, nearly 30 times.

There are a few other indications of the size of the GUGK which agree in general with above figures. In 1930 A.M. Mikhaylov, (49) discussing the availability of personnel, stated that the U.S.S.R. geodetic and cartographic program would require 2,900 engineers and 6,200 technicians. At this period, however, only 30 percent of this requirement could be satisfied. This means that in 1930 only 2,700 engineers and technicians were available. A 1:2 ratio of engineers to technicians may be considered as reasonable because of the high position of the author of this report. (member of the Collegium).

In 1937 S.V. Shirokov (50) published an article, "How To Catch Up and Overtake America in Geodesy". Taking his cue from Ordzhonikidze, Commissar of Heavy Industry, who had derided boastful assertions of some of the Soviet writers, Shirokov comes to the conclusion that Soviet geodesy was nowhere near the level of American geodesy. He asserts that in the U.S.A. there were 10,000 technical personnel working in geodesy. (this figure is considered grossly exaggerated by American geodesists) At any rate, the figure, 10,000, seemed to Shirokov very much greater than the number of available geodetic personnel in the U.S.S.R. We should note here that Shirokov is one of the few Soviet geodesists who is really acquainted with American geodesy, having been in the U.S.A. in 1930 and having published a detailed account of the status of geodesy in the U.S.A. and Canada (51).

After the World War II all references to the exact number of personnel disappear. We have only indefinite statements of "many thousands" of personnel in the system of the GUGK. One statement (5) asserts that cartographic production has increased four times since the war, which would mean a considerable increase in personnel.

There is every reason to think that the goal envisaged by Mikhaylov

in 1930 has been reached after the war, and that technical personnel now in the GUGK may be estimated as

	3,000 engineers
	<u>6,000</u> technicians
Total	9,000

In Technical Paper No. 162 of this Laboratory which described training facilities in the U.S.S.R. in geodesy and cartography, a conclusion was reached that trained personnel in geodesy and cartography in the U.S.S.R. must number (without taking into account the ravages of the war) at least

6,000 engineers
10,000 technicians.

It would appear that the system of the GUGK must absorb at least one-half, or possibly two-thirds, of all available personnel in geodesy and cartography in the U.S.S.R.

b. Political Influence. The more recent post-war publications evidence no undue political pressure in the system of GUGK. Reviews of current work are replete with patriotic phraseology and glorification of the Soviet regime, but criticisms of various individuals and sections of the GUGK usually are on some technical rather than political point. This is in marked contrast to the years 1936-37 when professional periodicals in the U.S.S.R. were full of accusation of "sabotage", "deviation from the policy laid down by the party", etc. In all cases whenever a checking is possible, the most important leaders in the system of the GUGK have turned out to be graduates of technical institutes (usually MIIGAik), meaning they may be considered to be competent in their own profession.

c. Role of Women. The striking feature of the GUGK is the number of women engineers who are not only engaged in laboratory work but also in actual surveying expeditions. In many cases one can tell by the spelling of the last name whether the person is a man or a woman. At any rate, of the 169 persons in the GUGK who received medals and decorations for excellence of work during the first half of 1948 (17) there were 89 men, 60 women and 20 persons whose sex could not be identified. Of the whole, then, at least 36 percent were women.

d. Compulsion. One is impressed with the intensity of professional life in the U.S.S.R. Either in a negative way (persons are named and their shortcomings are publicly discussed) or in a positive way (medals, decorations, prizes, etc.) a person is always pushed to do more and better work. Suggestions, inventions, improvements are welcome, but at the same time official instructions and norms of production leave very little for private initiative. Refresher courses are continuously set up even for persons in rather high positions. The periodic calling of "active" sessions (pep meetings) is specifically mentioned in the statutes of the GUGK. Various divisions of the GUGK compete with each other for the Red Banner which is vied for by each group. In short, the competition motive is very strong. A person caught in this system apparently has no time to think of anything but his professional work.

e. Complexity. The system of the GUGK is extremely complex as is quite apparent from what little information we were able to gather. A person outside of that system has very little chance of ascertaining, say, the exact nature of cartographic coverage of a certain territory. In order to do that he has to get permission of at least three divisions of

the GUGK: TsKGF, UGKN and the cartographic factory which is in charge of that particular territory. If he is given access at all to all these materials, he still has to deal with the Glavlit, (censorship).

Secrecy permeates everything in the GUGK, apparently to a much greater degree than elsewhere. It is probable that most employees of the GUGK have very little idea how this organization works as a whole. For an outsider having only fragmentary information at his disposal, the task is well nigh hopeless.

f. Comparison. It is impossible to equate the GUGK with any organization in the U.S.A. The nearest analogy would be the U.S. Coast and Geodetic Survey but total activities of the USC and G.S. in geodesy correspond to only one department of the GUGK (Administration of the Topographic and Geodetic Service). On the other hand, some of the functions of the USC and GS such as magnetic work, are being carried out in the U.S.S.R. by an entirely different complex of organizations (UGMS: Administration of Hydro-Meteorological Service). It is to be remembered that the GUGK is also in charge of cartographic factories and geodetic-topographic training, as well as of a research institute in geodesy, aerial survey and cartography.

Foreign control, which in the U.S.A. is a part of the responsibilities of the Army Map Service, is at least partially being taken care of by the GUGK (through UGKN and TsNIICAiK).

The GUGK is supposed to be a civilian organization, coordinating geodetic and cartographic work of civilian agencies such as the Ministry of Agriculture, Ministry of Forestry, Glavesevmorput' (Main Administration of the North Sea Route) and others. By statute all rules and regulations published by the GUGK are obligatory for other agencies in the U.S.S.R. A

specific exemption is made for the Army and Navy. Here we should note that in the reorganization of March 16, 1953, both the Army and Navy ministries were combined into one Ministry of Defense (Ministerstvo Oborony). We have, then, to consider the Ministry of Defense.

II. MINISTRY OF DEFENSE

A. MILITARY TOPOGRAPHIC ADMINISTRATION (VTU: Voenno-Topograficheskoye Upravleniye).

According to the statutes (Section 15) the relations between the GUGK and the Commissariats of Defense and of the Navy are to be regulated by a special statute which is not yet available to us. These relationships will have to be established on the basis of exceedingly scanty material. If our information on the activity of the GUGK after 1940 was quite inadequate, information on geodetic and cartographic activities of the Army and Navy is practically non-existent.

The Military Topographic Administration (VTU) is the direct successor of the Military Topographic Section (VTO, Voenno-Topograficheskiy Otdel) of the General Staff of the Imperial Army. The VTO had existed since 1822 and was the main geodetic and cartographic agency of the Russian Empire before the revolution. The old organization survived in pretty nearly the same form, and from what is known about it, bears a remarkable resemblance to the structure of the GUGK. The scale is undoubtedly much smaller which is not saying that the VTU is less important than the GUGK. With strong emphasis on military needs, it may well be that the VTU plays a more important role than the GUGK in the formulation of policies and general direction of geodetic and cartographic work.

The VTU is attached to the 7th Department of the General Staff, and undoubtedly consists of many subdivisions of which the following are known:

1. Military-Topographic Service (VTS: Voenno Topograficheskaya Sluzhba). This appears to be analogous to the UTGS of the GUGK. The responsibility of the VTS is to conduct geodetic and topographic work in assigned regions, which include the border regions of the U.S.S.R. In an assignment to adjust the general network of triangulation of 1st class in 1946, (6) the VTS was to take charge of the triangulation to the west of the Pulkovo-Nikolayev line, to the south of the Troitskosavsk-Mogocha-Khabarovsk-Vladivostok line, to the east of the Vladivostok-Ferma line and to the south of the Chardzhou-Mary-Krasnovodsk line as well as eleven numbered, but unidentified, loops of 1st class. The amount of work involved in this adjustment is roughly one-eighth of that of the entire net. From this we may draw the conclusion that the staff of the VTS is correspondingly smaller than that of the staff of the UTGS of the GUGK.

Another indication of the size of the VTS may be gleaned from a statement in a general review of the activity of the GUGK, 1919-1944 (1). We have in this source a separation of the work done by GUGK (and its predecessors) from that done by "other agencies" (not specified which agencies):

	Triangulation 1-st Order	Triangulation 2-nd order	Leveling 1st and 2nd order
All Agencies	75,300 km.	66,900 km.	127,550 km.
GUGK	65,200	44,500	115,950
Share of "other agencies"	10,100	22,400	11,600
Percentage	13	33	9

The only agency known to do first order triangulation outside the GUGK is the VTS, whereas triangulation of second and lower orders is carried out by many other organizations. Therefore 13 percent should represent the size of the VTS as compared with the UTGS of the GUGK. This is again about one eighth, the same as previously estimated.

2. Military-Engineering Academy (VIA: Voenno-Inzhenernaya Akademiya im. Kuybysheva in Moscow) is an institution of a higher level and provides instruction to the army engineers. One of its departments (faculties) is the department of geodesy which has been publishing since 1943, the Military Topographic Collections, (Voenno-Topograficheskiy Sbornik) of which a few issues (1943-46) are available. From these issues, at least 18 officers can be identified as being on the staff of the Department of Geodesy. The head of the department is probably General G.F. Gapochko. The Academy is also publishing many books covering all subjects of cartography, geodesy and photogrammetry. This organization is apparently analogous to the MIIGAik in the system of the GUGK.

3. Scientific Research Institute of the Military-Topographic Service (N.I. Institut Voenno-Topograficheskoy Sluzhby) corresponds to the TsNIIGAik. Very little is known about its activity, except that it publishes monographs, instructions, tables, etc.

It is not known whether the VTU has its own cartographic factories. A 1947 map of the U.S.S.R. on the scale of 1:4,000,000 bears the legend, "Kartograficheskaya Chast' VTU", which indicates the existence of some Cartographic Section at the VTU but not necessarily the existence of a printing establishment.

This information practically exhausts our knowledge of the VTU. Even less is known about the corresponding organizations in the U.S.S.R. navy.

The hydrographic office of the navy had been very active before 1940, as is evident from the long list of hydrographic maps listed for that year (52) and there is no reason to believe that its activity ceased in that year. The geodetic and cartographic activity of the Glavsevmorput' has been very considerable, but very little is known about the organization of its work.

The coordination of work of the GUGK and of the VTU is undoubtedly very close. All important orders, such as specifications for geodetic work of different orders are issued over the signature of the chiefs of both organizations. The chief of the VTU in 1946 was General Kudryavtsev.

III. SOVIET LITERATURE REFERENCED IN THIS REPORT

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APPENDIX I

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Sobraniye postanovleniy i rasporyazheniy Pravitel'stva SSSR.

STATUTE ON THE MAIN ADMINISTRATION OF GEODESY
AND CARTOGRAPHY UNDER THE COUNCIL OF PEOPLE'S COMMISSARS USSR

Numbers in parentheses refer to appended sources.

The statute of 23 August 1939 on the Main Administration of Geodesy and Cartography under the Council of People's Commissars USSR provides that:

1. The Main Administration will carry out the following general tasks:
 - a. Creation of a state geodetic base and a state topographic map of the USSR.
 - b. Satisfaction of national economic, scientific, and cultural-educational requirements for modern general and specialized political, administrative, physicogeographic, economic, and educational maps and atlases.
 - c. Exercise of state geodetic supervision and control over departmental topographic-geodetic and cartographic work.
2. The Main Administration is charged with the following specific duties:
 - a. Production of geodetic and survey work of general state significance: triangulations and astronomic calculations of the first and second classes, leveling instrument work of the first and second orders, basic gravimetric work, and topographic surveys in scale 1:25,000 and smaller.

b. Compilation and publication of general and specialized topographic, political, administrative, physico-geographic, economic, and educational maps, the Great Soviet World Atlas, and other atlases.

c. Reviews of and decisions regarding plans of departments and organizations for geodetic and surveying work, which have significance for mapping of USSR territory (aerial surveys in all scales; topographic surveys in scale 1:10,000 and smaller, made of areas greater than 100 square kilometers in size; triangulation and leveling instrument work done on areas of the same size or with a length greater than 50 kilometers).

d. Exercise of state control over the performance and quality of the topographic-geodetic and surveying work indicated in (c) done by all departments and organizations except the People's Commissariat of Defense USSR and the people's Commissariat of the Navy USSR.

e. Approval of scales for topographic surveys of individual parts of the USSR.

f. Coordination of all topographic-geodetic, aerial survey, gravimetric, and cartographic work done in the USSR; collection, systematization, and preservation of all topographic-geodetic, aerial survey, gravimetric, and cartographic materials pertaining to work indicated in (c); provision of information to all interested organizations concerning completed projects and available materials.

g. Utilization of all geodetic and survey materials received in the country for mapping of the USSR.

h. Creation and correction, on the basis of latest cartographic materials, of maps in scale 1:1,000,000 or smaller, required as geographic bases for special maps compiled by departments and organizations.

i. Approval of topographic-geodetic and geographic maps which are to serve as bases of special maps and atlases to be compiled by all departments and organizations; issuance of decisions on publication of all maps and atlases. (1) This section was rescinded by a subsequent decree.(2)7

j. Formulation and issuance of generally binding rules and instructions for the performance of topographic-geodetic, aerial survey, gravimetric, and cartographic work listed in (a) and (c) and the use of conventional signs; review and approval of instructions issued by departments and organizations concerning work performance and use of signs.

k. Establishment of a uniform method of transcription of geographic names, which is to be used in all cartographic publications in the USSR.

l. Training of cadres for topographic, geodetic, aerial survey, gravimetric, and cartographic work.

m. Organization and implementation of scientific research work in the fields of geodesy, topography, aerial surveying, and cartography.

n. Administration of all educational and scientific research institutions under the supervision of the Main Administration.

o. Organization of material and technical supply of production enterprises and institutions under the Main Administration; organization of sales of cartographic production.

p. Organization of production of geodetic, gravimetric, and aerial surveying instruments needed to perform the work of the Main Administration.

q. Supervision and control over the capital construction of institutions and enterprises under the Main Administration.

3. The Main Administration is granted the following rights:

a. To convene at least annually conferences of representatives

of interested departments, organizations, and scientific institutions on questions of geodesy, topography, cartography, and gravimetry.

b. To publish, in accordance with existing rules, dictionaries, catalogues, reviews, periodicals, and topographic-geodetic, aerial survey, gravimetric, and cartographic materials; to publish the periodical Geodezist.

c. To issue copyrights to authors and patents to inventors in the fields of geodesy and cartography.

4. Plotting of state boundaries of the USSR on the map is carried out by the Main Administration with the concurrence of the People's Commissariat of Foreign Affairs USSR.

5. The chief of the Main Administration is named by the Council of People's Commissars USSR. He has deputies, who are confirmed by the Council of People's Commissars USSR.

6. The chief supervises all activities of the Main Administration; within the limits of his authority, he issues orders and instructions on the basis of and in accordance with existing laws, decrees, and regulations of the Council of People's Commissars USSR and checks on their execution; he appoints and relieves the workers of the central apparatus of the Main Administration and the supervisors of institutions and enterprises under the Main Administration.

7. The Collegium of the Main Administration meets regularly under the chairmanship of the chief to review problems in practical supervision; it checks on execution of tasks, supervises selection of cadres, hears reports of workers from local organs, and formulates the most essential orders and instructions.

The membership of the Collegium is confirmed by the Council of People's Commissars USSR on recommendation of the chief of the Main Administration.

8. Decisions of the Collegium are carried out through orders issued by the chief of the Main Administration.

In case of a difference of opinion between the chief and Collegium, the chief carries out his decision, but brings the difference of opinion to the attention of the Council of People's Commissars USSR; the members of the Collegium may appeal the decision to the Council of People's Commissars USSR.

9. The Council of the Main Administration, the membership of which is confirmed by the Council of People's Commissars USSR on recommendation of the chief of the Main Administration, stands under the chief for purposes of contact with local organs and exchange of experience.

The Council meets once or twice monthly to hear and discuss reports concerning the most important problems in the work of the Main Administration.

10. The Main Administration has the following administrations, divisions, and other subdivisions:

Administration of Topographic-Geodetic Service

Administration of Cartographic Industry

Administration of State Geodetic Control

Administration of Educational Institutions

Division of Supply (1) [subsequently raised to Administration of Supply (3)]

Division of Map Publication Control

Sales Division

Planning Division

Finance Division

Central Bookkeeping Office

Cadres Division

Labor and Wages Sector

Capital Construction Division

Transcription Bureau; (1) [subsequently raised to a higher level (3)]

Mobilization Division

Secret Division

Administrative Affairs Office

Secretariat

11. The Inspectorate, which is charged with checking on how the administrations and divisions of the Main Administration and all institutions and enterprises subordinated to it carry out party and government decrees, as well as the orders and instructions of the Main Administration, is placed under the chief of the Main Administration.

12. The Main Administration has representatives under the councils of people's commissars of the union republics, as well as under the oblast and kray executive committees in Leningrad, Novosibirsk, Khabarovsk, Irkutsk, Gor'kiy, Sverdlovsk, Kuybyshev, Saratov, and Voroshilovsk.

The sphere of activity of each of the representatives under the indicated oblast and kray executive committees is determined by the Main Administration.

13. The following organizations are under the direct supervision of the Main Administration on the basis of charters confirmed for them:

- a. Publishing House of Geodetic and Cartographic Literature
- b. Editorial staff of the periodical Geodezist

14. In accordance with established procedure, the Main Administration has the right to organize enterprises which will be of economic value.

15. Relations between the Main Administration and the People's Commissariat of Defense USSR and the People's Commissariat of the Navy USSR in regard to topographic-geodetic and cartographic work will be regulated by a special statute, confirmed by the Council of People's Commissars USSR.

16. The chief of the Main Administration will regularly assemble the aktiv of the Main Administration to utilize the experience of its economic, scientific, and engineering-technical workers.(1)

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2. "On Partial Changes in the Statute on the Main Administration of Geodesy and Cartography Under the Council of People's Commissars, 16 September 1940," Sobraniye postanovleniy -- , No. 25, Item 609, 1940.

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APPENDIX II

RANKS AND DECORATIONS IN THE GUGK

The following 18 ranks in the system of the GUGK were introduced by the Supreme Council of the U.S.S.R. on June 10, 1949 (published in the Vedomosti Verkhovnogo Soveta SSSR, No. 29(57), June 24, 1949):

1. General State Director of the Topographic Service.
(General'nyy Gosudarstvennyy Direktor Topograficheskoy Sluzhby).
2. State Director of the Topographic Service
(Gosudarstvennyy Direktor Topograficheskoy Sluzhby).
 - a. First rank
 - b. Second rank
 - c. Third rank.
3. Director of the Topographic Service
(Direktor Topograficheskoy Sluzhby)
 - a. First rank
 - b. Second rank
 - c. Third rank
5. Director of the Topographic Administrative Service
(Direktor Topografichesko-administratsionoy Sluzhby).
 - a. First rank
 - b. Second rank
 - c. Third rank
6. Engineer of the Topographic Service
(Inzhener Topograficheskoy Sluzhby)
 - a. First rank
 - b. Second rank
 - c. Third rank

7. Technician of the Topographic Service
(Tekhnik Topograficheskoy Sluzhby)
 - a. First rank
 - b. Second rank
 - c. Third rank
8. Junior Technician of the Topographic Service
(Mladshiy Tekhnik Topograficheskoy Sluzhby)
9. Foreman of the Topographic Service
(Desyatnik Topograficheskoy Sluzhby)

All personnel of the CUGK wear uniforms with stripes on the lapels indicating their rank. These stripes are made of black velour 12 cm. in length and are edged with green cloth for all ranks except those for directors (ranks 1, 2, 3, and 4) which are of gold cloth.

All lapel stripes have at the top the emblem of the service (theodolite) except for the General Director whose stripe has the state-emblem of the hammer and sickle.

A description of these lapel stripes is given in the Great Soviet Encyclopedia Vol. 17, 1953, p. 126. It is as follows: (See Fig. 2)

1. Five-pointed gold star 25 mm. size, surrounded by rays.
- 2a. Three, five-pointed gold stars without rays arranged in a line along a strip of 20 mm. size.
- 2b. Same, except with two such stars.
- 2c. Same, except with one star.
3. Two, parallel, gold stripes and four golden stars, 15 mm. in size, arranged in a line along the strip between the stripes.
- 4a. Same, with three golden stars.
- 4b. Same, with two golden stars.
- 4c. Same, with one golden star.

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- 5a. Two, parallel, silver stripes and three silver stars, 15 mm. in size, arranged in a line along the strip between the stripes.
- 5b. Same, with two silver stars.
- 5c. Same, with one silver star.
- 6a. One, gold stripe along the lapel and four golden stars, 12 mm. in size placed on the stripe.
- 6b. Same, with three golden stars.
- 6c. Same, with two golden stars.
- 7a. Same, with one golden star.
- 7b. No gold stripe, two golden stars, 12 mm. in size, arranged along the lapel.
- 7c. Same, but with one golden star.
- 8. One emblem of the topographic service at the top of the stripe and another at the bottom.
- 9a. Three, gold hash-stripes, width 4 mm. each.
- 9b. Same, with two gold stripes.
- 9c. Same, with one gold stripe.

Very similar lapel stripes exist for many other ministry administrations, directorates, etc. with very similar ranks. The only difference in the lapels is often in the emblem at the top.

The breast decoration of the GUGK (nagrudnyy znachok) shows the map of the U.S.S.R. with a theodolite in the left lower corner and a triangulation geodetic tower in the other. The inscription reads "to the outstanding (worker) in geodesy-cartography" (otlichniku geodezii-kartografii). Awards of such decorations are covered by the same general rules in all ministries and organizations and are given only to persons systematically fulfilling or over-fulfilling various plans. Each organization is assigned a certain

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number of such decorations. Persons receiving them cannot be discharged from service without an order from the minister or the head of the administration. A person may be deprived of such a sign only when definite charges are brought against him and his conduct proved to be inconsistent with regulations covering the award.

There are many other awards and decorations which can be earned by individual members of the GUGK, such as the Stalin prize (Stalinskiye Premii, 1st, 2nd and 3rd class, with substantial monetary awards), Order of Distinction in Science and Technology (Zasluzhennyy Deyatel' Nauki i Tekhniki), etc. Individual organizations within the GUGK may be awarded the Order of the Red Banner (Krasnoye Znanya). Such awards are retained by that particular institution so long as its work is considered outstanding.

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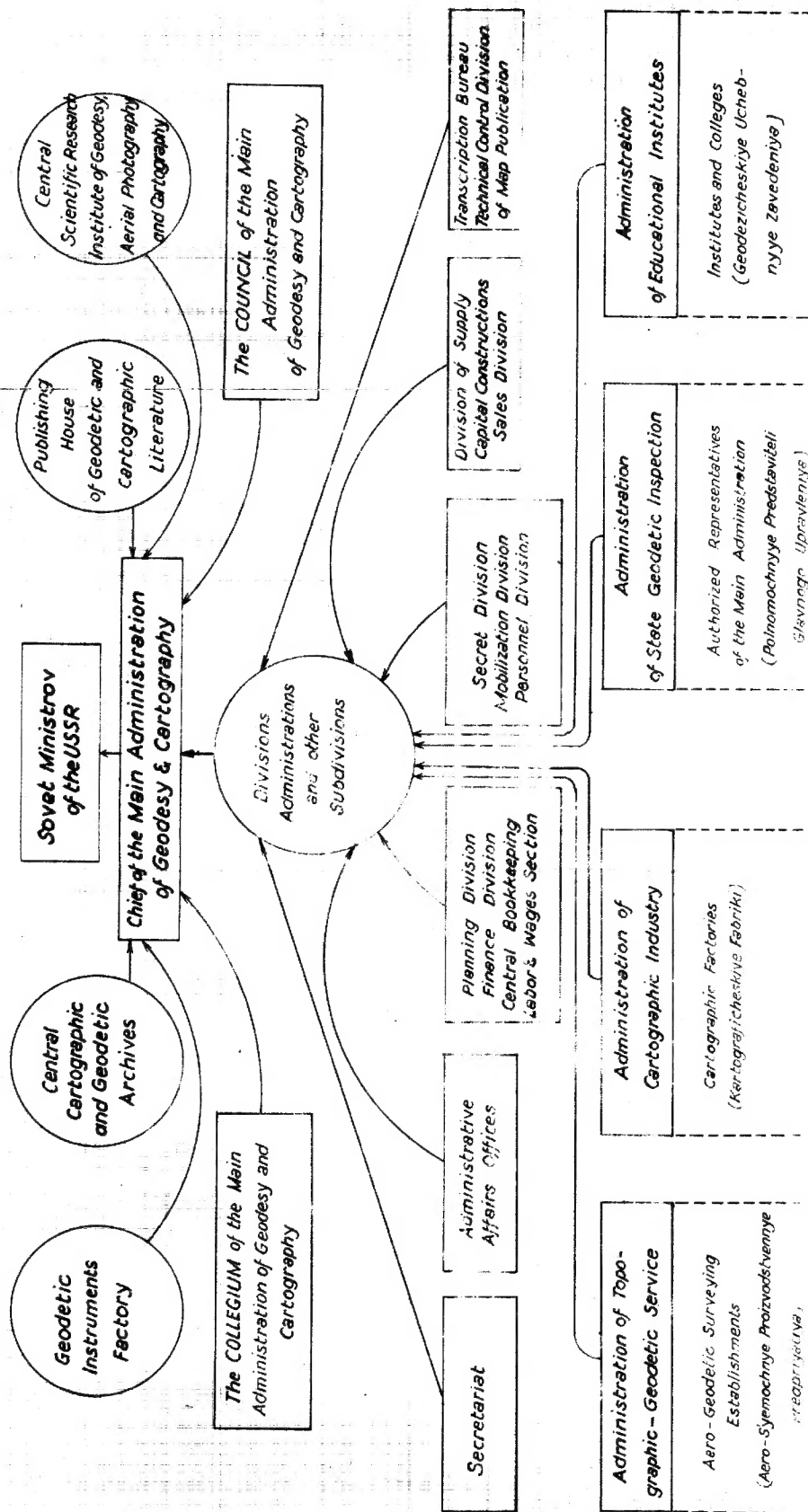


Figure 1.

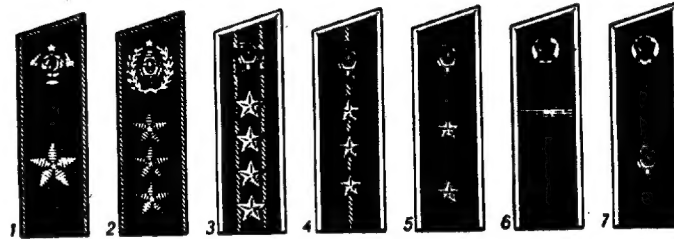


Figure 2

Decorations of the Main Administration of Geodesy and Cartography under the Council of Ministers of the U.S.S.R. (Znaki razlichiya Glavnogo Upravleniya Geodezii i Kartografii pri Sovete Ministrov SSSR).

1. General State Director of the Topographic Service
(General'nyy Gosudarstvennyy Direktor Topograficheskoy Sluzhby).
2. State Director of the Topographic Service of the First Rank
(Gosudarstvennyy Direktor Topograficheskoy Sluzhby 1-go Ranga).
3. Director of the Topographic Service
(Direktor Topograficheskoy Sluzhby).
4. Engineer of the Topographic Service of the Second Rank
(Inzhener Topograficheskoy Sluzhby 2-go Ranga).
5. Technician of the Topographic Service of the Second Rank
(Tekhnik Topograficheskoy Sluzhby 2-go Ranga).
6. Foreman of the Topographic Service of the Third Class
(Desyatnik Topograficheskoy Sluzhby 3-go Klassa).
7. Junior Technician of the Topographic Service (Mladshiy Tekhnik Topograficheskoy Sluzhby).

Source: Bol'shaya Sovetskaya Entsiklopediya, Vol. 17,
2nd Edition, 1952.
Figure on Page 124.